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EXAMINER
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NAM, HYUN

ART UNIT	PAPER NUMBER
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2184

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ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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172

<b>Office Action Summary</b>	Application No. 10/823,241	Applicant(s) ELKINGTON ET AL.	
	Examiner Hyun Nam	Art Unit 2184	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 December 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: *RESOURCE MANAGEMENT SYSTEM AND METHOD FOR MANAGING CRITICAL RESOURCE USAGE BY MONITORING QUEUE DEPTH AND MANAGING WAITING QUEUE.*

### ***Claim Objections - Formality***

Claims 1-7 and 19-21 are objected to because of the following informalities:

In claim 1, line 3, "associated" should be "--association with--".

Claim 19 recites the term 'tangible' which is not defined in the specification. The specification is also objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o).

Appropriate correction is required.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 19-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The phrase, 'a tangible processor usable medium' in the claims 19-21 are a non-statutory subject matter (see MPEP 2106.01) because the definitions found in the disclosure did not exclude an unpatentable medium such as an optical, electromagnetic, and/or propagating signal (see Instant Application, Paragraph 58, Lines 7 and 14). Since, 'a tangible processor usable medium' could be construed as optical, electromagnetic, and/or propagating signal medium, 'a tangible processor useable medium' then would not be any of the statutory subject matter, a "process, machine, manufacture, or composition of matter." Examiner recommends following amendments to specification and claim 19:

In specification, Paragraph 58, Line 14, "communicate, propagate, or transport" should be deleted; and

In claim 19, line 2, "a tangible processor useable medium" should be "--a computer readable medium--".

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6 and 15-21 are rejected under 35 U.S.C. 102(b) as being anticipated by the Dandrea et al. (U.S. Application Publication 2002/0013864), herein after referred to as Dandrea '864, the particulars of which are further described by Bleidt et al. (U.S. Patent 5,671,377), herein after referred to as Bleidt '377 (see Dandrea '864, Paragraph 28, Line 7; Bleidt '377 is incorporated by reference in Dandrea '864).

Referring to claim 1, Dandrea '864 teaches a method of managing resource usage (see Abstract, Lines 1 and 2) comprising:

queuing accesses (see Paragraph 30, Lines 2-3, 6-8, and 12-14) of at least one resource (see Fig. 2, Hard Disks 120s; An array of disk storage is one of the resource in this Video Server system) in associated at least one respective resource queue (see Fig. 2, Statistical Disk Scheduler (SDS) Queues 200s and Internal Disk Queues 125s; Three types of SDS Queues are Stead-State Queue

(SSQ) 221s, New Subscriber Queues (NSQ) 222s, and Other Request Queues (ORQ) 223s);

monitoring queue depth (see Fig. 5, Steps 560 and 570; A Step 560 checks to see if Internal Disk Queues are Full and a Step 570 checks to see if all of the 3 Queues in SDS is empty) in the at least one resource queue (SSQ, NSQ, ORQ, and Internal Disk Queues are all associated with Hard Disk resource) and for a predetermined level of resource consumption (see Fig. 5, Steps 560 and 570);

preventing issue of subsequent commands (see Fig. 5, Step 300; When Internal Disk Queue is not Full and three of SDS Queues are not Empty then SDS Selection sub-routine is called in Fig. 3; see Fig. 3, Steps 315 and 325; If accepting new request keeps from existing request(s) to miss the deadline(s) then the new request will be discarded which prevent its access to the Disks) from a client (see Fig.1, Subscribers 160s) to a server (see Fig. 1, Video Server 110) in a client/server combination (Subscriber/Video Server) in response to a command (see Fig. 5, Step 520; The SSQ handles Steady-State Request or command) of the client/server combination that increases resource consumption to the predetermined level (Note, subscribers requesting services from the video server will increase resource consumption to the level stated above);

pushing an identifier (see Fig. 8, Disk 0-N in SDS Queues, and see Bleidt '377, Fig. 11, ID 1114) of the client/server combination onto a waiting queue (see Fig. 8, SDS Queues) associated with a resource (Disks) for which the resource consumption is increased to the predetermined level (see Fig. 13A Step 1318; Note, Tcrit, critical time unit, is a predetermined level of time where reading from Disk will occur and when consumption is increased to indicate Tcrit then completion of reading the Disk is expected) that holds identifiers of client/server combinations (see Fig. 8; Note, DISK 0 in SDS Queues is a identifier of request from 825<sub>0</sub>, and the SDS Queues will hold that until the read request has been completed);

detecting a decline in consumption of a resource of the at least one resource (see Fig. 5, Step 570; Note, checking for empty queue is detecting a decline in consumption of a queue resource corresponding to Disks resource);

popping a client/server combination identifier from a waiting queue (see Fig. 3, Steps 360 and 370; The request S is removed from SSQ) associated with the resource for which a decline in consumption is detected in order (see Fig. 5, Step 530; The SSQ ordered by the time deadline) of queuing (see Fig. 5, Step 560 and 570; When Internal Disk Queue is not full and all SDS Queues are empty then the demand on the resource has declined); and

re-enabling issue of commands (see Fig. 3, Steps 340 and 370; NSQ holds New Subscriber Request such as request to rewind or replay of videos) from the client to the server designated by the popped client/server combination identifier (see Fig. 3, Step 390).

As to claim 2, Dandrea '864 teaches the method according to Claim 1 further comprising:

managing resource usage for clients that require a specific resource (see Fig. 1, Hard Disks 120).

As to claim 3, Dandrea '864 teaches the method according to Claim 1 further comprising:

enabling issue of commands (see Fig. 3, Step 390; A request from SDS queues has been forwarded to Internal Disk Queues so that video stream can be provided) of a client/server combination in order of queuing (see Paragraph 8, Lines 6 and 7) as resource availability is restored (see Paragraph 44, Lines 2-4).

As to claim 4, Dandrea '864 teaches the method according to Claim 1 further comprising:



receiving a command (see Fig. 5, Step 520; A Steady-State Request from the Subscriber) from a client (see Fig. 1 Subscribers 160s) to a server (see Fig. 1 Video Server 110) that increases consumption (Note, a Steady-State Request is made to consume video data stream) of a resource (see Fig. 1, Hard Disks 120s) to a predetermined resource consumption condition (Note, subscribers requesting services from the video server will increase resource consumption to the level stated above);

setting a flag (see Fig. 5, Step 580; A SELECT flag set to TRUE after performing Step 300 from Fig. 3) indicative of the predetermined resource condition (Note, a selection procedure for Disks are indicative of the predetermined resource condition);

allowing the command to complete (see Fig. 3, Step 390); and

rejecting subsequent commands issued by the client to the server (see Fig. 3, Step 325).

As to claim 5, Dandrea '864 teaches the method according to Claim 1 further comprising:

detecting an increase (see Fig. 5, Step 560; Checking to see if Internal Disk Queue is full detects an increase) in consumption of a resource (see Fig. 1 Hard Disks 120s) to a level above a preselected limit (see Fig. 5 Step 560; Determination of what amount of request in the queue is Full condition is the pre-selected limit); and

queuing an identifier (see Fig. 1, Subscribers 160s; It is inherent that this Video Server keeps track of each subscribers in the SDS Queues (see Bleidt '377, Fig. 9, Step 904 for the further evidence)) of the client/server combination on a waiting queue (see Fig. 5, Step 520; The SSQ is holding queue for the Steady-State Request by the Subscribers) associated with the resource.

As to claim 6, Dandrea '864 teaches the method according to Claim 5 further comprising:

detecting a decline in consumption of the resource (see Fig. 5, Steps 560 and 570; When Internal Disk Queue is not full and all SDS Queues are empty then the demand on the resource has declined);

removing (see Fig. 3, Steps 360 and 370) a client/server combination identifier (see Fig. 1 Subscribers 160s; It is inherent that this Video Server keeps track of each subscribers in the SDS Queues (see Bleidt '377, Fig. 9, Step 904 for the

further evidence)) from the waiting queue (see Fig. 3, Step 360; SSQ holds Steady-State Requests) in the queue order (see Fig. 4, Step 530); and enabling (see Fig. 3, Step 390) subsequent commands of the client/server combination removed from the waiting queue for operation.

As to claims 15-18, they are directed to a data handling system comprising at least one controller (see Fig. 1, Statistical Disk Scheduler) to implement the method as set forth in claims 1, 4, 5, and 6 respectively. Therefore, they are rejected on the same basis as set forth hereinabove.

As to claims 19-21, they are directed to an article of manufacture to implement the methods as set forth in claims 1, 4, and 5 respectively. Therefore, they are rejected on the same basis as set forth hereinabove.

Claims 8-14 are rejected under 35 U.S.C. 102(b) as being anticipated by the Krakirian (U.S. Patent 5,603,066), hereinafter Krakirian '066.

Referring to claim 8, Krakirian '066 teaches a storage system (see Fig. 3) comprising:

at least one storage controller (see Fig. 3, Disk Controller 212) controlling data transfers (see Fig. 3, Read Channel 210 and SCSI Bus 203) between at least

one host adapter (see Fig. 3, SCSI Interface 211) and at least one storage array configured as physical storage (see Fig. 3, Disk 208) and logical storage (see Fig. 10B, LBA indexes at CFIFO6-8), the logical storage being arranged in logical units (see Fig. 10B, CLUN index at CFIFO4);

at least one resource utilized in the data transfers (see Fig. 3, Disk 208);

at least one resource queue (see Fig. 4, CFIFO 217) respectively associated with the at least one resource (see Fig. 3, Hard Disk 208) and that queues accesses to the associated resource (see Fig. 10B, CLUN index at CFIFO4); and

a logic (see Fig. 7A) that queues accesses (see Fig. 7A-1, Step 12h, Receive Command) of at least one resource (SCSI Bus, see Fig. 7A-1) in associated at least one resource queue (Note, SCSI Bus is associate with at least one SCSI Disk resource queue), monitors queue depth in the at least one resource queue (see Fig. 7A-1, Step with 'Is Queue Full (QFULL=1)?'; Note, monitoring to see if queue is full is monitoring queue depth to full level) for a predetermined resource consumption condition (see Fig. 7A-1, Step with 'QFULL=1'), identifies an and adapter (see Fig. 7A, RCV\_IDTAG) that issues commands to a LUN (see Fig. 10B, CLUN index at CFIFO4) in an adapter/LUN combination associated with a command that contributes to the predetermined resource consumption condition (see Fig. 7A-1, Step with RCV\_CMD), queues an identifier of the identified

adapter/LUN combination on a waiting queue (see Fig. 7A-1, Step with RCV\_IDTAG) associated with a resource for which the resource consumption is increased to the predetermined level (see Fig. 7A-1, Step with 'QFULL=1'; Note, FULL is a predetermined level), and prevents issue of subsequent commands of the identified adapter/LUN combination (see Fig. 7A-1, Step STOP).

As to claim 9, Krakirian '066 teaches the storage system according to Claim 8 further comprising:

a logic (see Fig. 7B-1) that detects a decline in resource consumption (see Fig. 7B-1, Step with 'Is Transfer Done (XDONE=1)?'), dequeues (see Fig. 4, CFIFO; Note, the nature of First-In-First-Out queue is to de-queue first queue item first) the adapter/LUN combination identifier from the waiting queue (see Fig. 4, CFIFO 217), and re-enables commands of the dequeued adapter/LUN combination (see Column 7, Lines 61-63; Note, when command leaves the CFIFO, operation on the Disc is taking place) for operation.

As to claim 10, Krakirian '066 teaches the storage system according to Claim 8 further comprising:

at least one resource selected from a group consisting of dynamic caching structures (see Fig. 4, SCSI Host Sequencer 221; and Column 8, Lines 30-34),

queues (see Fig. 4, CFIFO 217), buffers (see Fig. 3, Buffer Memory 205), and remote copy resources (see Fig. 3, Hard Disk 208; Note, a hard drive is a remote copy resource where as RAM is a local copy resource).

As to claim 11, Krakirian '066 teaches the storage system according to Claim 8 further comprising:

a logic (see Fig. 3) that manages resource usage for host adapters that require a specific resource (see Fig. 3, Hard Disk 208).

As to claim 12, Krakirian '066 teaches the storage system according to Claim 8 further comprising:

a logic (see Fig. 7A-1) that detects receipt of a command (see Fig. 7A-1, Step with 'Receive Command') from an adapter to a LUN (see Fig. 10B, CLUN index at CFIFO4) that increases consumption of a resource above a preselected limit (see Fig. 7A-1, Step with 'Is Queue Full'; Note, when IDCMD Sequence tests for QFULL and is directed to Step with 'STOP' then that particular command sequence has exceeded the given queue resource), sets a flag indicative of a predefined condition of the resource (see Fig. 7A-1, Step with 'QFULL=1'), allows the received command to complete (see Fig. 7A-2, Step with 'Go to XFR

Sequence'), and rejects subsequent commands issued by the adapter to the LUN (see Fig. 7A-1, Step with 'STOP').

As to claim 13, Krakirian '066 teaches the storage system according to Claim 8 further comprising:

a logic (see Column 13, Line 16; Note, state machine) that detects an increase consumption (see Column 13, Lines 18-21; Note, two-byte queue instead of a byte queue) of a resource above the preselected limit (Note, one byte queue), and queues an identifier (Note, tag byte loaded into CFIFO2 of CFIFO 217) of the adapter/LUN combination on a waiting queue (see Fig. 4, CFIFO 217) associated with the resource.

As to claim 14, Krakirian '066 teaches the storage system according to Claim 13 further comprising:

a logic (see Fig. 7D) that detects a decline in consumption (see Fig. 7D, Step with 'Send Command Complete Message and go Bus Free') of the resource, removes an adapter/LUN combination identifier from the waiting queue (see Fig. 4, CFIFO 217; Note, the nature of First-In-First-Out queue is to de-queue first queue item first) in the queue order (FIFO), and enables subsequent commands of the adapter/LUN combination removed from the waiting queue (see Column 7,

Lines 61-63; Note, when command leaves the CFIFO operation on the Disc is taking place) for operation.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 7 is rejected under 35 U.S.C. 103(a) as obvious over Dandrea '864 in view of Krakirian '066.

As to claim 7, Dandrea '864 teaches the method according to Claim 1 implemented in a storage system (see Fig. 1, Video Server 110) further comprising:

at least one storage controller (see Fig. 1, Statistical Disk Scheduler 170);

at least one host adapter operational as a client (see Fig.1, Subscribers 160s);



at least one adapter/LUN (see Fig. 1, Subscribers 160s and Disks 120s) combination operational as a client/server combination (see Fig. 1, Subscribers 160s and Video Server 110); and

at least one resource selected from a group consisting of dynamic caching structures (see Fig. 3, Step 380), queues (see Fig. 2, SDS Queues 200s), buffers (see Fig. 2, Disk Queues 125s), and remote copy resources (see Fig. 2, Hard Disks 120s).

Dandrea '864 does not specifically teach the method according to Claim 1 implemented in a storage system further comprising at least one storage array configured as physical storage and logical storage, the logical storage being arranged in logical units (LUNs) operational as servers.

Krakirian '066 does teach the method according to Claim 1 implemented in a storage system (see Fig. 3) further comprising at least one storage array (see Fig. 3, Disk Controller 212) configured as physical storage (see Fig. 3, Disk 208) and logical storage (see Fig. 10B, LBA indexes at CFIFO6-8), the logical storage being arranged in logical units (see Fig. 10B, CLUN index at CFIFO4) operational as servers.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify Dandrea '864's storage system to comprise Krakirian

'066's SCSI storage system that utilizes Logical and Physical storage arrangement. One of ordinary skilled in the art would be motivated to do this because SCSI (Note, each device on SCSI Bus is assigned at least one Logical Unit Number and a direct access storage device consists of a number of logical blocks) bus can handle array of hard drives which would increase storage capacity and open options for future upgrades.

### ***Response to Arguments***

Applicant's arguments filed 12/11/2007 have been fully considered but they are not deemed to be persuasive.

**Applicant argues, amended Claims 1-6 and 15-20 distinguish over Dandrea as described by Bleidt at least on the basis that the references do not disclose usage of waiting queues that hold identifiers of client server combinations wherein the waiting queue is associated with resources for which resource consumption is increased and reduced (see Page 9, Lines 12-16).**

Examiner disagrees with applicant. Various waiting queues in the Dandrea, holds identifier of clients combinations or server combination wherein the waiting queues are associated with Disk storage resources. Examiner has mapped the new claim elements above.

**Applicant argues, amended Claims 8-14 distinguish over Krakirian at least on the basis that the reference does not disclose "queu[ing] an identifier of the identified adapter/LUN combination on a waiting queue associated with a resource for which the resource consumption is increased to the predetermined level." (see Page 10, Lines 16-19).**

Examiner disagrees with applicant. When queue associated with storage resource reaches FULL level, the resource consumption is increased to the predetermined level. Examiner has mapped the new claim elements above.

### ***Conclusion***

The prior art made of record and not relied upon are considered pertinent to applicant's disclosure:

Govett (U.S. Patent 5,761,507) discloses client/server architecture supporting concurrent servers within a server with a transaction manager providing server/connection decoupling.

**Contact Information**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hyun Nam whose telephone number is (571) 270-1725. The examiner can normally be reached on Monday through Friday 8:30 AM to 5:00 PM EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Henry Tsai can be reached on (571) 272-4176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
HENRY TSAI  
SUPERVISORY PATENT EXAMINER 2/4/08